

A1 Cont'd
involve the following problem. When a film is formed on a film that has been formed previously, the quality of the previously formed film is impaired in some cases, for example the case which the previously formed film is an organic material. An investigation as to the cause of the impairment revealed that a sputtering voltage; i.e., a discharge voltage, is responsible. An increase in discharge voltage increases kinetic energy of recoiled gas particles and the strength of an accelerating electric field for negative ions in a cathode sheath. The accelerating electric field in a cathode sheath brings about disturbance on a process of arranging sputtered particles on deposition surface when the deposited film consists of organic materials or oxides, or involves rare earth elements. A discharge voltage depends on, for example, a gas pressure and the mechanical layout of target units. Since, for example, a change in gas pressure influences the quality of a formed film, the adjustment of the discharge voltage has been difficult.

Page 11, paragraph bridging over to page 12, has been amended as indicated below:

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To achieve the aforementioned objects, the present invention also provides a facing-targets-type sputtering method comprises (a) generating, between a pair of facing targets disposed a predetermined distance away from each other, a magnetic field extending from one target to the other in such a manner as to surround a discharge space provided between the paired targets, to thereby confine plasma within the discharge space by means of the magnetic field; and (b) performing sputtering under vacuum so as to form a film on a substrate disposed at a position beside the discharge space, wherein electrons are caused to be reflected into the discharge space by use of electron reflection means disposed around the corresponding targets, and power generated through

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Contd' superposition of high-frequency power to direct-current power is applied to the targets to effect the sputtering.

Page 13, paragraph bridging over to page 14, has been amended as indicated below:

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Notably, the present invention is preferably applied to formation of a metal film, particularly a Cu film, a Cu alloy film, an Al film, or an Al alloy film. Also, the present invention is preferably applied to formation of a wiring film on a semiconductor substrate involving formation of a film on the wall of a very fine hole of high aspect ratio. Preferably, a film is formed under high vacuum at a gas pressure of 0.05 Pa or lower, in view of prevention of such a bad effect of sputtering gas bombarding a formed film surface; i.e., prevention of damage to the interface of a deposited layer. Through employment of a box-type sputtering unit and a sputtering gas pressure of 0.01 Pa or lower as in Experiment 3, the method of the present invention can form a film on the wall of a very fine hole and is thus favorably applicable to formation of a wiring film on a semiconductor substrate to be used in production of an LSI.

IN THE CLAIMS:

Please amend claims 1-18 as indicated below:

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1. (Amended) A facing-targets sputtering apparatus for producing a film on a substrate comprising:
a vacuum chamber vessel having two openings formed in two corresponding facing side faces thereof;
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